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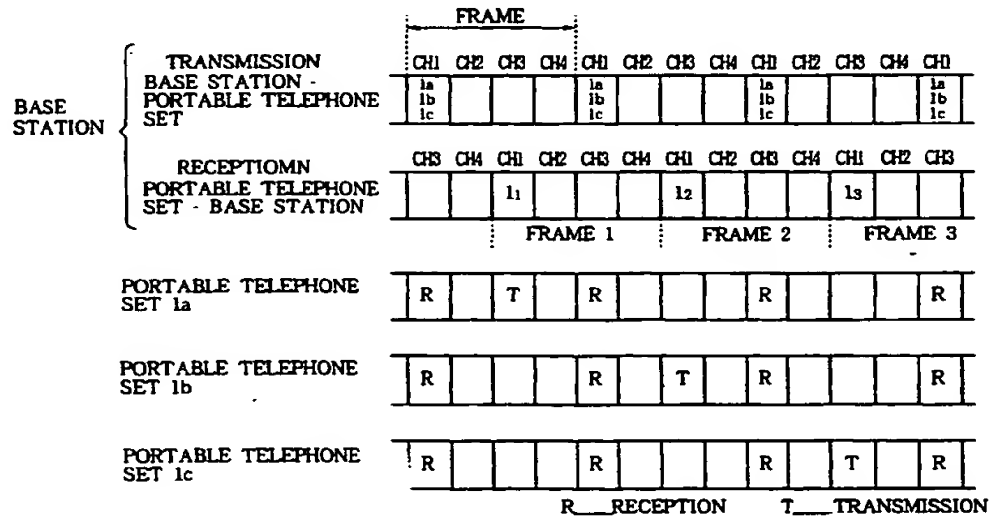
(54) Title: CHANNEL ALLOCATION METHOD AND CONNECTION CONTROL STATION



(57) Abstract: A junction station of a telepho : ne : k is constructed for connecting with a plurality of telephone terminals by a link multiplexed to provide a multiple of . nn.ls f : ownloading of digital contents from a data source to a plurality of telephone terminals. In the junction station, a detec: g block detects when a plurality of telephone terminals issue connection requests within a predetermined time interval for downlo..ng of the same digital contents. An allocating block is responsive to the detecting block for allocating one of the multiple of the channels of the multiplexed link commonly to the plurality of the telephone terminals to establish a downward connection to the plurality of the telephone terminals. A controlling block obtains the digital contents from the data source through the telephone network and distributes the obtained digital contents concurrently to the plurality of the telephone terminals by the commonly allocated channel.

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DESCRIPTION

CHANNEL ALLOCATION METHOD AND CONNECTION CONTROL STATION

TECHNICAL FIELD

The present invention generally relates to a channel allocation method and a connection control station or base station for a telephone network system in which a base station and a plurality of telephone terminal sets communicate with each other through a multiplex line, these method and control station being suitable for use in a cellular system.

BACKGROUND ART

With wireless telephone systems such as an automobile telephone system and a PDC (Personal Digital Cellular) telecommunication system known as analog and digital cellular systems and a PHS (Personal Handyphone System), communication between a base station and two or more telephone terminal sets is performed through a TDMA (Time Division Multiple Access) radio channel. The base station is allocated with a unique frequency band that does not cause interference with adjacent base stations. The channels of this frequency band are used as TDMA channels to support communication between multiple telephone terminal sets and their base station.

The following describes a conventional scheme of channel allocation for communication between a base station and portable telephone sets, which are a kind of telephone terminal sets. FIG. 8 illustrates the time-divisional arrangements of transmit/receive channels to be allocated to each portable telephone set when communication is made between the base station and portable telephone sets 1a through 1c, and the way of using the time-divisional arrangement of transmit/receive channels by the base station.

The transmit channel (downstream channel) from the base station to each portable telephone set and the receive channel (upstream channel) from each portable telephone set to the base station are composed of four channels CH1 through CH4 obtained by time dividing one frame. For example, when three portable telephone sets 1a, 1b, and 1c are communicating with the base station, the CH1 is allocated to the portable telephone 1a such that the downstream channel of the CH1 is allocated for transmission to the portable telephone set 1a and the upstream channel of the CH1 is allocated to reception from the portable telephone set 1a. The CH2 is allocated to the portable telephone 1b such that the downstream channel of the CH2 is allocated for transmission to the portable telephone set 1b and the upstream channel of the CH1 is allocated to reception from the portable telephone set 1b. The CH3 is

allocated to the portable telephone 1c such that the downstream channel of the CH3 is allocated for transmission to the portable telephone set 1c and the upstream channel of the CH3 is allocated to reception from the portable telephone set 1c. Namely, as shown in the figure, the portable telephone set 1a can communicate with the base station through the CH1, the portable telephone set 1b through the CH2, and the portable telephone set 1c through the CH3.

As described, with the conventional cellular systems, one channel consisting of upstream and downstream channels is dedicated to each portable telephone set for communication with the base station. Consequently, if the number of multiple channels between the base station and the portable telephone sets is set to 4 per one wireless link or line as shown in FIG. 8, any excess portable telephone sets cannot communicate with the base station. Namely, call losses occur in such a configuration. Especially, call loss occurrence is increasing with the recent growth of information distribution such as weather forecast and news and data distribution such as music data for ringing melodies.

DISCLOSURE OF INVENTION

It is therefore an object of the present invention to provide a channel allocation method and a connection control

station for providing efficient data transmission facility by enhancing channel utilization efficiency.

In carrying out the invention and according to one aspect thereof, there is provided a method of connecting a plurality of telephone terminals to a junction station by a link multiplexed to provide a multiple of channels for downloading digital contents from a data source to a plurality of telephone terminals through the junction station in a telephone network. The inventive method comprises the steps of detecting when a plurality of telephone terminals issue connection requests within a predetermined time interval to the junction station for downloading of the same digital contents, then allocating one of the multiple of the channels of the multiplexed link commonly to the plurality of the telephone terminals to establish a downward connection from the junction station to the plurality of the telephone terminals, and distributing the same digital contents by the commonly allocated channel concurrently to the plurality of the telephone terminals through the junction station.

Preferably, the step of allocating allocates one of the multiple of the channels contained in a multicast link, which is reserved for exclusive use of distributing digital contents to a plurality of telephone terminals.

Preferably, the link is composed of a sequence of frames, and is multiplexed by dividing each frame into a

multiple of time slots to define the multiple of the channels, and the step of allocating allocates one time slot of each frame corresponding to the one channel cyclically to the plurality of the telephone terminals so as to establish an upward connection from each telephone terminal to the junction station.

Otherwise, the link is composed of a sequence of frames, and is multiplexed by dividing each frame into a multiple of time slots to define the multiple of the channels, and the step of allocating further divides the time slot corresponding to the one channel to define a plurality of sub channels, and allocates the plurality of the sub channels to the plurality of the telephone terminals to establish an upward connection from the plurality of the telephone terminals to the junction station.

Preferably, a plurality of telephone terminals are portable, and are connected to the junction station by a wireless link.

In carrying out the invention and according to another aspect thereof, there is provided a method of connecting a plurality of telephone terminals to a junction station by a link multiplexed to provide a multiple of channels for downloading digital contents from a data source to a plurality of telephone terminals through the junction station in a telephone network. The inventive method comprises the steps of allocating one of the multiple of the

channels to one telephone terminal to establish a downward connection when the one telephone terminal issues a connection request to the junction station for the downloading of digital contents, transferring the digital contents by the allocated channel to the one telephone terminal, detecting when another telephone terminal issues a connection request to the junction station for downloading of the same digital contents during the transferring of the same digital contents to the one telephone terminal, and then allocating the same channel to said another telephone terminal as the one telephone terminal to establish a downward connection from the junction station to said another telephone terminal such that a part of the digital contents can be distributed concurrently to the one telephone terminal and said another telephone terminal by the same channel.

Preferably, the inventive method further comprises the step of continuing the distributing of the remaining part of the digital contents to said another telephone terminal after the distributing of the digital contents to the one telephone terminal is completed.

In carrying out the invention and according to a still another aspect thereof, there is provided a connection control station of a telephone network for connecting with a plurality of telephone terminals by a link multiplexed to provide a multiple of channels for downloading of digital

contents from a data source to a plurality of telephone terminals. In the connection control station, a detecting block detects when a plurality of telephone terminals issue connection requests within a predetermined time interval for downloading of the same digital contents. An allocating block is responsive to the detecting block for allocating one of the multiple of the channels of the multiplexed link commonly to the plurality of the telephone terminals to establish a downward connection to the plurality of the telephone terminals. A controlling block obtains the digital contents from the data source through the telephone network and distributes the obtained digital contents concurrently to the plurality of the telephone terminals by the commonly allocated channel.

In carrying out the invention and according to still another aspect thereof, there is provided a connection control station of a telephone network for connecting with a plurality of telephone terminals by a link multiplexed to provide a multiple of channels for downloading of digital contents from a data source to a plurality of telephone terminals. In the connection control station, an allocating block allocates one of the multiple of the channels to one telephone terminal to establish a downward connection when the one telephone terminal issues a connection request to the junction station for the downloading of digital contents. A controlling block obtains the digital contents

from the data source through the telephone network and transfers the obtained contents to the one telephone terminal by the allocated channel. A detecting block detects when another telephone terminal issues a connection request to the junction station for downloading of the same digital contents during the transferring of the same digital contents to the one telephone terminal, for enabling the allocating block to allocate the same channel to the another telephone terminal as the one telephone terminal so as to establish a downward connection to said another telephone terminal such that a part of the same digital contents can be distributed concurrently to the one telephone terminal and said another telephone terminal by the same channel.

According to the invention, when transmitting the data of the same contents to two or more telephone terminal sets, one downstream channel is allocated for simultaneous transmission to the two or more telephone terminal sets. Consequently, two or more telephone terminal sets can be connected to a base station serving as a junction station or connection control station only by one channel for data transmission. This enhances channel utilization efficiency, thereby minimizing the occurrence of call loss.

If other requests for the same contents occur during the transmission of the contents, the one downstream channel is allocated to all of the requesting telephone terminal sets for the transmission of the data of the same contents.

Consequently, two or more telephone terminal sets can be connected to a base station serving as a connection control station by one channel for data transmission. This enhances channel utilization efficiency, thereby minimizing the occurrence of call loss.

Further, the upstream channels to be used by the telephone terminal sets at the time of changing the request for contents are cyclically or sequentially allocated at time intervals, which are integral multiples of a frame period. Alternatively, the allocated channel is time divided into sub channels, which are allocated to all requesting telephone terminal sets for upstream channels. Because the data transmitted from each telephone terminal set to the base station are mainly composed of a request change, even the low-speed upstream channels can sufficiently serve their purposes.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a schematic diagram illustrating a general configuration of a cellular system to which a channel allocation method of the invention is applicable.

FIG. 2 is a schematic block diagram illustrating an exemplary configuration of a portable telephone set used in the cellular system to which the channel allocation method of the invention is applicable.

FIG. 3 is a diagram illustrating a first embodiment of the channel allocation method of the invention.

FIG. 4 is a diagram illustrating a second embodiment of the channel allocation method of the invention.

FIG. 5 is a block diagram illustrating one embodiment of a base station serving as a connection control station of the invention.

FIG. 6 is a sequence diagram illustrating a first channel allocation method of the invention practiced in the base station associated with the invention.

FIG. 7 is a sequence diagram illustrating a second channel allocation method of the invention practiced in the base station associated with the invention.

FIG. 8 is a conventional channel allocation method for communication between a base station and portable telephone sets, which are a kind of telephone terminal sets.

BEST MODE FOR CARRYING OUT THE INVENTION

The configuration of a cellular system to which the channel allocation method according to the present invention is applicable is outlined in FIG. 1. Generally, the cellular system in portable telephony is based on a small zone called a cell and has many wireless zones in each service area. Each wireless zone is managed by a base station allocated in the zone. When a portable telephone, which is a mobile exchange, calls a general telephone, the

portable telephone set is connected to a mobile exchange through the base station which manages the wireless zone to which the portable telephone set belongs. The portable telephone set is further connected from the mobile exchange to a general telephone network. Thus, the portable telephone set is connected to the base station that manages the wireless zone through a wireless channel for conversation with a remote party.

FIG. 1 illustrates one example of such a cellular system in which portable telephone sets 1a through 1d belong to a wireless zone managed by a base station 2c among base stations 2a through 2d. The portable telephones 1a through 1d are connected to the base station 2c through a time division multiple access (TDMA) wireless link. Upstream signals for conversation and positional registration from the portable telephone sets 1a through 1d are received by the base station 2c and processed there. Downstream signals transmitted from the base station 2c, which are a conversation signal from a telephone terminal of the other party and download data are received by the originating portable telephone set 1a to 1d. The base stations 2a through 2d each manage a different wireless zone. The wireless zones may overlap with each other in periphery. The base stations 2a through 2d are each connected to a mobile exchange 3 through a multiplex channel. Two or more mobile exchanges 3 are concentrated in a gate exchange 4 to

be connected to a general telephone exchange 5b. Two or more gate exchanges 4 are interconnected by a repeating transmission path. General telephone exchanges 5a, 5b, 5c, and so on are arranged each for an area, which are also interconnected by a repeating transmission path. Each of the general telephone exchanges 5a, 5b, 5c, and so on is connected with many general telephones. For example, a download center 6 having a music database and a contents distribution center 7 are connected to the general telephone exchange 5b.

New music titles are added to the download center 6 from time to time, lot of music data being accumulated in a music database (music DB) therein. In the present invention, music data can be downloaded from the download center 6 connected to the general telephone network into the portable telephones 1a through 1d and other telephone terminal sets. In addition, the contents distribution center 7 accumulates most recently updated weather forecast, news and so on. These contents may be distributed from the contents distribution center 7 connected to the general telephone network to the portable telephone sets 1a through 1d and other telephone terminal sets.

In order for the portable telephone set 1a for example to download music data, the portable telephone set 1a dials the telephone number of the download center 6. The portable telephone set 1a is connected to the base station 2c, the

mobile exchange 3, the gate exchange 4, the general telephone exchange 5b, the general telephone exchange 5a, and to the download center 6. Next, the user operates necessary controls on the portable telephone set 1a by following guidance displayed in a monitor display, thereby downloading the music data of a desired title from the music database. The music data in this case includes musical note data and timbre data. In the same manner, weather forecast and news can be distributed from the contents distribution center 7 to the portable telephone set 1a.

The portable telephone sets 1a through 1d each have the same configuration, of which example is illustrated in FIG. 2. As shown in FIG. 2, a portable telephone set 1 has generally retractable antenna 25, which is connected to a communication block 13 having modulation and demodulation capabilities. A central processing unit (CPU) 10 is a system controller for controlling the components of the portable telephone set 1 by executing telephone function programs and has a timer for indicating an elapsed time in operation and for causing a timer interrupt at a particular time interval. A RAM (Random Access Memory) 11 provides storage areas for storing music data downloaded from the download center 6 arranged in a general telephone network for example or loaded from an external device 20, and user setting data. The RAM 11 further provides and a work area for the CPU 10. A ROM (Read Only Memory) 12 stores various

telephone function programs such as call origination and termination programs to be executed by the system CPU 10, a program for supporting music reproduction processing, and various types of data such as preset music data.

The communication block 13 demodulates a signal received at the antenna 25 and modulates a signal to be transmitted to a base station 2, sending the modulated signal from the antenna 25. The received conversation signal demodulated by the communication block 13 is decoded by a voice processing block 14 having a coder/decoder. A voice signal for transmission inputted from a microphone 21 is compressively encoded by the voice processing block 14. The voice processing block 14 executes highly efficient compressive encoding and decoding on the voice signal for transmission by means of the coder/decoder based on CELP (Code Excited LP) or ADPCM (Adaptive Differential PCM). A music reproduction block 15 reproduces music data as a ringing tone and/or a holding tone or BGM when the received conversion signal from the voice processing block 14 is sounded from a speaker 22. It should be noted that the ringing tone is sounded from a ringing tone speaker 23 and the BGM and/or the holding tone is mixed with the received conversation signal to be sounded from a conversation speaker 22.

If the music reproduction block 15 reproduces music data, the CPU 10 reads the music data from the RAM 11 or the

ROM 12 and transfers the retrieved music data to the music reproduction block 15. An interface (I/F) 16 interfaces the downloading of music data composed of musical note data and timbre data for example from an external device 20 such as a personal computer. An input block 17 of the portable telephone set 1 provides input means made up of numeric keys 0 through 9, code keys, a jog dial, and other controls. A display block 18 displays telephone function menus and information resulted from the operation of controls on the input block 17. A vibrator 19 vibrates the body of the portable telephone set 1 upon call termination to tell the user instead of sounding a ringing tone. These functional blocks transfer data and commands with each other over a bus 24.

The following describes, with reference to FIG. 3, a first embodiment of the channel allocation method according to the invention practiced in the cellular system shown in FIG. 1. FIG. 3 illustrates the arrangements of time-division transmit/receive channels to be allocated to each portable telephone set when communication is made between the base station 2c and the portable telephone sets 1a through 1c, and usage of the time-division transmit/receive channels by the base station 2c. FIG. 3 illustrates a channel allocation in which the wireless link between the base station 2a and the portable telephone sets 1a through 1c is constituted by four time-division multiplex wireless

channels, one frame being composed of the four channels. To be specific, the transmit channel (downstream channel) from the base station 2c to each of the portable telephone sets 1a through 1c and the receive channel (upstream channel) from each of the portable telephone sets 1a through 1c to the base station 2c are composed of four channels CH1 through CH4 obtained by timing-dividing one frame. In the example shown in FIG. 3, three portable telephone sets 1a, 1b, and 1c are communicating with the base station 2c and, at the same time, requesting and downloading the same music data from the download center 6 the or the same data from the contents distribution center 7.

Thus, when requesting the same contents (hereafter, it is assumed that contents include music data) and transferring the requested contents, the downstream channel CH1 from the base station 2c is shared by the three portable telephone sets 1a through 1c as the transmit channel. The first CH1 (a sub channel 1_1) at frame 1 of every four frames of the upstream channel is allocated as the transmit channel running from the portable telephone set 1a to the base station 2c. The second CH1 (a sub channel 1_2) at frame 2 of every four frames of the upstream channel is allocated as the transmit channel running from the portable telephone set 1b to the base station 2c. The third CH1 (a sub channel 1_3) at frame 3 of every four frames of the upstream channel is

allocated as the transmit channel running from the portable telephone set 1c to the base station 2c.

Namely, as shown in the figure, the three portable telephone sets 1a through 1c and the base station 2c share the CH1 of the four multiplex channels, the base station 2c transmitting the data of the same contents through the downstream channel of the CH1. The three portable telephone sets 1a through 1c shares the allocated CH1, thereby receiving the data of the same contents transmitted from the base station 2c. The three portable telephone sets 1a through 1c are allocated with the sub channels 1_1 through 1_3, respectively, of the CH1 of every four frames having different timings for transmission to the base station 2c. This allows the three portable telephone sets 1a through 1c to communicate with the base station 2c by use of only one channel CH1, thereby enhancing channel utilization efficiency. It should be noted that information to be transmitted from each of the portable telephone sets 1a through 1c is mainly about updating of contents for example. Consequently, even if the allocated transmit channel is slow, it sufficiently serves its purpose.

As described above, the inventive method is designed for connecting a plurality of telephone terminals to a base station or junction station by a link multiplexed to provide a multiple of channels for downloading digital contents from a data source to a plurality of telephone terminals through

the junction station in a telephone network. The inventive method is performed by the steps of detecting when a plurality of telephone terminals issue connection requests within a predetermined time interval to the junction station for downloading of the same digital contents, then allocating one of the multiple of the channels of the multiplexed link commonly to the plurality of the telephone terminals to establish a downward connection from the junction station to the plurality of the telephone terminals, and distributing the same digital contents by the commonly allocated channel concurrently to the plurality of the telephone terminals through the junction station. As shown in the figure, the telephony link is composed of a sequence of frames, and is multiplexed by dividing each frame into a multiple of time slots to define the multiple of the channels. One time slot of each frame corresponding to the one channel is allocated cyclically to the plurality of the telephone terminals so as to establish an upward connection from each telephone terminal to the junction station.

The following describes, with reference to FIG. 4, a second embodiment of the channel allocation method according to the invention practiced in the cellular system shown in FIG. 1. It should be noted that FIG. 4 illustrates the arrangements of time-division transmit/receive channels to be allocated to the portable telephone sets 1a through 1c

when they communicate with the base station 2c and the usage of the time-division transmit/receive channels by the base station 2c.

FIG. 4 also shows an example in which the wireless link between the base station 2c and the portable telephone sets 1a through 1c is constituted by four time-division multiplex wireless channels, one frame providing four channels. To be more specific, the transmit (downstream) channel from the base station 2c to the portable telephone sets 1a through 1c and the receive (upstream) channel from the portable telephone sets 1a through 1c to the base station 2c are selected from four channels of CH1 through CH4 obtained by time dividing one frame into four slots. FIG. 4 shows a channel allocation in which the three portable telephone sets 1a, 1b, and 1c are communicating with the base station 2c and, at the same time, requesting and downloading the same music data from the download center 6 or the same data from the contents distribution center 7.

In the second embodiment, when the data of the same contents (it is assumed that contents includes music data) are requested for transfer, the downstream channel CH1 from the base station 2c is shared by the three portable telephone sets 1a through 1c to provide the transmit channel. The upstream channel CH1 is further time divided into four sub channels 1_1 through 1_4, the sub channel 1_1 being allocated to the transmit channel running from the

portable telephone set 1a to the base station 2c, the sub channel 1_2 being allocated to the transmit channel running from the portable telephone set 1b to the base station 2c, and the sub channel 1_3 being allocated to the transmit channel running from the portable telephone set 1c to the base station 2c. As shown in the figure, the telephony link is composed of a sequence of frames, and is multiplexed by dividing each frame into a multiple of time slots to define the multiple of the channels. The time slot corresponding to the allocated one channel is further divided to define a plurality of sub channels. The plurality of the sub channels are allocated to the plurality of the telephone terminals to establish an upward connection from the plurality of the telephone terminals to the junction station.

Namely, as shown in the figure, the three portable telephone sets 1a through 1c and the base station 2c share the CH1 of the four multiplex channels, the base station 2c transmitting the data of the same contents through the downstream channel. The three portable telephone sets 1a through 1c shares the allocated CH1, thereby receiving the data of the same contents transmitted from the base station 2c. The three portable telephone sets 1a through 1c are allocated with the sub channels 1_1 through 1_3 obtained by time dividing the upstream channel of the CH1 for transmission to the base station 2c. This allows the three

portable telephone sets 1a through 1c to transfer data with the base station 2c by use of only one channel of the CH1, thereby enhancing channel utilization efficiency. It should be noted that information to be transmitted from each of the portable telephone sets 1a through 1c may be about contents update for example. Consequently, even if the allocated transmit channel is slow, it sufficiently serves its purpose.

It should be noted that the first and second embodiments represent the channel allocation method in which contents are requested and data thereof are transferred to the requesting portable telephone sets. When a normal conversation is requested, the channel allocations shown in FIGS. 3 and 4 are not carried out. The channel allocation in which the three portable telephone sets 1a, 1b, and 1c request for a normal conversation in the cellular system shown in FIG. 1 is effected as shown in FIG. 8 as a regular allocation method.

Referring to FIG. 8, there is shown an example in which the time division multiplex wireless link between the base station 2c and the portable telephone sets 1a through 1d is constituted by four channels. The transmit (downstream) channel from the base station 2c to the portable telephone sets 1a through 1d and the receive (upstream) channel from the portable telephone sets 1a through 1d to the base

station 2c are selected four channels of CH1 through CH4 obtained by time dividing one frame into four time slots.

When the three portable telephone sets 1a, 1b, and 1c are communicating with the base station 2c, the CH1 is allocated to the portable telephone set 1a, the downstream channel of the CH1 being allocated to the transmission from the base station 2c to the portable telephone set 1a and the upstream channel of the CH1 being allocated to the reception from the portable telephone set 1a. The CH2 is allocated to the portable telephone set 1b, the downstream channel of the CH2 being allocated to the transmission to the portable telephone set 1b and the upstream channel of the CH2 being allocated to the reception from the portable telephone set 1b. The CH3 is allocated to the portable telephone set 1c, the downstream channel of the CH3 being allocated to the transmission to the portable telephone set 1c and the upstream channel of the CH3 being allocated to the reception from the portable telephone set 1c. Namely, as shown in the figure, the portable telephone set 1a can transfer data with the base station 2c through the CH1, the portable telephone set 1b through the CH2, and the portable telephone set 1c through the CH3. Thus, in normal conversation, the same channel allocation as that of the prior art is executed, resulting in the same channel utilization efficiency as that of the prior art.

Referring to FIG. 5, there is shown a configuration of an embodiment of the base station 2 serving as a connection control station associated with the invention. As shown in FIG. 5, reference numeral 31 denotes an antenna, which is generally a diversity antenna. Reference numeral 31 denotes a duplexer (DUP) for branching a receive signal received at the antenna 31 to a receiving block 33 and a transmit signal coming from a transmitting block 38 to the antenna 31. The receiving block 33 demodulates the receive signal and supplies a connection request signal included in the receive signal to a connection request signal detecting block 34; if the receive signal is a disconnection signal, the receiving block 33 sends the disconnection signal to a disconnection signal detecting block 37. The receiving block 33 supplies signals other than the connection request signal and the disconnection signal to the controller 36. Receiving the connection request signal, the connection request signal detecting block 34 determines whether the received signal is for a normal conversation request or a contents download request and, according to the determined request, supplies channel allocation information to a channel allocation block 35. This connection request signal detecting block 34 determines a request signal by the telephone number of the destination included in the connection request signal and a contents request by the address of the destination included in the connection request signal.

The channel allocation block 35 performs channel allocation according to channel allocation information to set a channel allocated to the base station 2 to the transmitting block 38 and, at the same time, supplies the channel allocation information allocated to the portable telephone set 1 to the controller 36. The controller 36 sends out an origination information and a conversation signal supplied from the receiving block 33 to the mobile exchange 3 through a link and, at the same time, supplies a connection request signal coming from the link to the connection request signal detecting block 34 and a disconnection request signal coming from the link to the disconnection signal detecting block 37. In addition, the controller 36 supplies termination information, a conversation signal, or contents data coming from the link to the transmitting block 38, thereby controlling the base station 2 in its entirety. The transmitting block 38 modulates each signal supplied from the controller 36 so that the signal can be transmitted through the channel set by the channel allocation block 35 and supplies the modulated signal to the DUP 32.

The following describes, with reference to a first communication sequence shown in FIG. 6, a first channel allocation method of the invention to be executed in the base station 2 associated with the invention of the configuration shown in FIG. 5.

In the communication sequence shown in FIG. 6, the portable telephone set 1a transmits a connection request signal by use of a control channel. Assume that this connection request signal requests for downloading of music 1 from the download center 6. The connection request signal detecting block 34 determines that this signal is for a contents request because the telephone number of the destination included in this signal indicates the download center 6, and waits for another connection request from other portable telephone sets for a predetermined time, for example, five seconds, from the first connection request signal. As shown, assume that the connection request signals for requesting the download center 6 for music 1 have come from the portable telephone set 1b and the portable telephone set 1c. When the connection request signal detecting block 34 of the base station 2 detects such connection request signals requesting for the same contents, the connection request signal detecting block 34 allocates a transmit channel and a receive channel to each of the three portable telephone sets 1a through 1c. In this case, because the three portable telephone sets 1a through 1c are requesting the same contents, one channel is allocated in a shared manner.

To be more specific, the portable telephone set 1a is allocated with the CH1 as a receive channel and the CH1 of frame 1 (hereafter referred to as sub channel $CH1_1$) shown in

FIG. 3 as a transmit channel. The portable telephone set 1b is allocated with the CH1 as a receive channel and the CH1 of frame 2 (hereafter referred to as sub channel $CH1_2$) shown in FIG. 3 as the transmit channel. The portable telephone set 1c is allocated with the CH1 as a receive channel and the CH1 of frame 3 (hereafter referred to as sub channel $CH1_3$) shown in FIG. 3 as a transmit channel. Information about these channel allocations is sent from the channel allocation block 35 to the controller 36. This information is then sent to the transmitting block 38 to be modulated. The modulated information is transmitted through the DUP 38 and the antenna 31 to the three portable telephone sets 1a through 1c. It should be noted that the channel allocation block 35 sets the transmit channel of the base station 2 to the transmitting block 38 according to the above-mentioned channel allocations; in this case, the channels for the transmission to the portable telephone sets 1a through 1c is set to the CH1.

Because the connection request signal is for downloading music 1, the controller 36 reads the music data of music 1 from the download center 6 through the link between the mobile exchange 3, the gate exchange 4, the general telephone exchange 5b, the general telephone exchange 5a, and the download center 6. The retrieved music data of music 1 are supplied from the controller 36 to the transmitting block 38. The music data are modulated by the

transmitting block 38 and the modulated music data are transmitted over the CH1 through the DUP 38 and the antenna 31. By way of the CH1, the three portable telephone sets 1a through 1c can download the music data of music 1. When the downloading of the music data of music 1 comes to an end in the portable telephone set 1a and the end button is operated, a disconnection request is transmitted to the base station 2 through the transmit channel of the sub channel $CH1_1$, upon which the base station 2 disconnects the link with the portable telephone set 1a. Likewise, when the downloading of the music data of music 1 comes to an end in the portable telephone set 1b and the end button is operated, a disconnect request is transmitted to the base station 2 through the transmit channel of the sub channel $CH1_2$, upon which the base station 2 disconnects the link with the portable telephone set 1b.

Assume here that, when the downloading of the music data of music 1 has come to an end in the portable telephone set 1c, a connection request for downloading music 2 from the download center 6 be transmitted to the base station 2 through the transmit channel of the sub channel $CH1_3$. Assume again that a connection request for downloading of music 2 from the download center 6 be made from the portable telephone set 1d during a predetermined time from the reception of the connection request from the portable telephone set 1c, for example, five seconds. Then, in the

base station 2, the connection request signal detecting block 34 detects that there are plural connection request signals requesting for the same contents and reallocates the transmit and receive channels to the two portable telephone sets 1c and 1d.

Namely, the portable telephone set 1c is allocated with the CH1 as the receive channel and the sub channel $CH1_1$ as the transmit channel. The portable telephone set 1d is allocated with the CH1 as the receive channel and the sub channel $CH1_2$ as the transmit channel. The information about these channel allocations is sent from the channel allocation block 35 to the controller 36. The information is modulated by the transmitting block 38 and the modulated information is transmitted to the two portable telephone sets 1c and 1d through the DUP 38 and the antenna 31. It should be noted that the channel allocation block 35 sets the transmit channel of the base station 2 to the transmitting block 38 according to the above-mentioned channel allocations; in this case, the channel for transmission to the portable telephone sets 1c and 1d is set to the CH1.

The controller 36 reads the music data of music 2 from the download center 6 through the link to the download center 6. The retrieved music data of music 2 are supplied from the controller 36 to the transmitting block 38 to be modulated therein. The modulated music data of music 2 are

transmitted through the DUP 38 and the antenna 31 over the CH1. By way of the CH1, the two portable telephone sets 1c and 1d can download the music data of music 2. When the downloading of the music data of music 2 has come to an end in the portable telephone set 1c and the end button is operated, a disconnection signal is transmitted to the base station 2 through the sub channel $CH1_1$, upon which the base station 2 disconnects the link with the portable telephone set 1c. Likewise, when the downloading of the music data of music 2 has come to an end in the portable telephone set 1d and the end button is operated, a disconnection request is transmitted to the base station 2 through the sub channel $CH1_2$, upon which the base station 2 disconnects the link with the portable telephone set 1d.

Thus, if the same music data are downloaded, the music data can be distributed to plural telephone terminal sets by use of only one channel. When plural telephone terminal sets request for the distribution of weather forecast and news of the same contents with a predetermined time, the above-mentioned channel allocation method can be also used to distribute the requested weather forecast and news of the same contents from the contents distribution center 7 by use of only one channel. It should be noted that the predetermined wait time for the occurrence of a connection request for the same contents is not limited to five seconds.

In the foregoing description, the channel allocation is performed according to the first channel allocation method of the invention shown in FIG. 3. It will be apparent that the channel allocation may be performed according to the second channel allocation method of the invention shown in FIG. 4.

The music data distributed from the download center 6 and the weather forecast and news distributed from the contents distribution center 7 are stream data. It will be apparent that the channel for use in distributing these stream data to plural telephone terminal sets may be reserved as a multicast line for preferential use. Namely, the allocation block 35 allocates one of the multiple of the channels contained in a multicast link, which is reserved for exclusive use of distributing digital contents to a plurality of telephone terminals.

The following describes, with reference to a second communication sequence shown in FIG. 7, a second channel allocation method of the invention practiced in the base station 2 associated with the invention having the configuration shown in FIG. 5.

In the communication sequence shown in FIG. 7, the portable telephone set 1a sends a connection request signal for downloading of music 1 by use of a control channel. Because the telephone number of the destination included in the received connection request signal indicates the

download center 6, the connection request signal detecting block 34 determines this signal as requesting for downloading of contents. Consequently, the connection request signal detecting block 34 allocates a transmit channel and a receive channel to the portable telephone set 1a. In this case, the CH1 is allocated as the receive channel and the sub channel $CH1_1$ is allocated as the transmit channel to the portable telephone set 1a. Because this connection request signal is for downloading music 1, the controller 36 reads the music data of music 1 from the download center 6 through the link between the mobile exchange 3, the gate exchange 4, the general telephone exchange 5b, the general telephone exchange 5a, and the download center 6. The retrieved music data of music 1 are supplied from the controller 36 to the transmitting block 38. The music data are modulated by the transmitting block 38 and the modulated music data are transmitted over the CH1 through the DUP 38 and the antenna 31. By way of the CH1, the portable telephone sets 1a can download the music data of music 1.

Assume that, during downloading of the music data of music 1, a connection request signal for downloading music 1 comes from the portable telephone set 1b. If the connection request signal detecting block 34 of the base station 2 detects such a connection request signal for requesting the same contents, the connection request signal detecting block

34 allocates the CH1 as a receive channel and the sub channel $CH1_2$ as a transmit channel to the portable telephone set 1b. At this moment, the music data of music 1 are being transmitted from the transmitting block 38 of the base station 2 to the portable telephone set 1a through the DUP 32 and the antenna 31. Therefore, when the portable telephone set 1b connects through the CH1, the portable telephone set 1b receives a part of the music data of music 1, which are stream data. At this moment, the portable telephone 1a also uses the CH1 to continue the downloading of the music data of music 1.

Next, assume that a connection request signal for downloading of music 2 comes from the portable telephone set 1c. Because the telephone number of the destination included in the connection request signal indicates the download center 6, the connection request signal detecting block 34 determines this signal to be a request for downloading of music contents. However, the contents requested by this signal is different from that requested by the other portable telephone sets, so that the connection request signal detecting block 34 allocates the CH2 as a receive channel and the CH2 of frame 1 (hereafter referred to as a sub channel $CH2_1$) shown in FIG. 3 to the portable telephone set 1c. Because the connection request signal indicates the request for downloading of music 2, the controller 36 retrieves the music data of music 2 from the

download center 6 through the link between the mobile exchange 3, the gate exchange 4, the general telephone exchange 5b, the general telephone exchange 5a, and the download center 6. The retrieved music data of music 2 are supplied from the controller 36 to the transmitting block 38. The music data are modulated by the transmitting block 38 and the modulated music data are transmitted over the CH2 through the DUP 32 and the antenna 31. By way of the CH1, the portable telephone set 1c can download the music data of music 2.

Assume that, during downloading of the music data of music 2, the downloading of music 1 have come to an end in the portable telephone set 1a, and the portable telephone set 1a changes a request to send a connection request signal for downloading of music 2 to the base station 2 through the sub channel $CH1_1$. Then, when the connection request signal detecting block 34 of the base station 2 detects this connection request signal for requesting the downloading of music 2, the connection request signal detecting block 34 allocates the CH2 as a receive channel and the CH2 of frame 2 (hereafter referred to as a sub channel $CH2_2$) shown in FIG. 3 as a transmit channel to the portable telephone set 1a, because the music data of music 2 are being transmitted through the CH2. By way of the CH2, the portable telephone set 1a can download a part of the music data of music 2, which are stream data being transmitted from the

transmitting block 38 of the base station 2 through the DUP 32 and the antenna 31 over the CH2. At this moment, the portable telephone set 1c continues the downloading of the music data of music 2 by way of the CH2.

Besides, the music data of music 1, which are stream data, are being transmitted from the transmitting block 38 of the base station 2 through the DUP 32 and the antenna 31 over the CH1. By way of CH1, the portable telephone set 1b which has been downloading the part of music 1 continues the downloading of the remaining music data of music 1.

When the downloading of the music data of music 1 has come to an end in the portable telephone set 1b and the end button is operated, a disconnection signal is transmitted to the base station 2 through the transmit sub channel $CH1_2$, upon which the base station 2 disconnects the link with the portable telephone set 1b. Likewise, when the downloading of the music data of music 2 has come to an end in the portable telephone set 1c and the end button is operated, a disconnection request is transmitted to the base station 2 through the transmit sub channel $CH2_1$, upon which the base station 2 disconnects the link with the portable telephone set 1c.

By way of the CH2, the portable telephone set 1a, which has been downloading the part of the music data of music 2 being transmitted from the transmitting block 38 of the base station 2 through the DUP 32 and the antenna 31 over the

CH2, continues downloading of the remaining music data of music 2. When the portable telephone set 1a ends the downloading of the remaining part of music 2 and the end button is operated, a disconnection request signal is sent to the base station 2 through the transmit sub channel CH22, upon which the base station disconnects the link with the portable telephone set 1a.

As described, according to the second embodiment of the invention, the junction station or base station is constructed in a telephone network for connecting with a plurality of telephone terminals by a link multiplexed to provide a multiple of channels for downloading of digital contents from a database to a plurality of telephone terminals. In the junction station, the allocating block 35 allocates one of the multiple of the channels to a first telephone terminal to establish a downward connection when the first telephone terminal issues a connection request to the junction station for the downloading of digital contents. The controlling block 36 obtains the digital contents from the database through the telephone network and transfers the obtained contents to the first telephone terminal by the allocated channel. The detecting block 34 detects when a second telephone terminal issues a connection request to the junction station for downloading of the same digital contents during the transferring of the same digital contents to the first telephone terminal, for enabling the

allocating block 35 to allocate the same channel to the second telephone terminal as the first telephone terminal so as to establish a downward connection to the second telephone terminal such that a part of the digital contents can be distributed concurrently to the first telephone terminal and the second telephone terminal by the same channel. Further, the controlling block 36 continues the distributing of the remaining part of the digital contents to the second telephone terminal after the distributing of the digital contents to the first telephone terminal is completed.

A machine readable medium such as a CD-ROM may be used in the junction station having a processor for connecting with a plurality of telephone terminals by a link multiplexed to provide a multiple of channels for downloading of digital contents from a data source to a plurality of telephone terminals through the junction station. The medium contains program instructions executable by the processor for causing the junction station to perform the inventive method described above.

In the foregoing description, the channel allocation is performed according to the first channel allocation method of the invention shown in FIG. 3. It will be apparent that the channel allocation may be performed according to the second channel allocation method of the invention shown in FIG. 4.

The music data distributed from the download center 6 and the weather forecast and news distributed from the contents distribution center 7 are stream data. It will be apparent that the channel for use in distributing these stream data to plural telephone terminal sets may be reserved as a multicast line for preferential use.

If the contents downloaded to a telephone terminal set are music data as described above, the downloaded music data may be used as a ringing melody for telling the termination of a call or a holding tone or may be reproduced as BGM.

INDUSTRIAL APPLICABILITY

As mentioned above and according to the invention, when transmitting the data of the same contents to two or more telephone terminal sets, one downstream channel is allocated for simultaneous transmission to the two or more telephone terminal sets. Consequently, the two or more telephone sets can be connected to a base station serving as a connection control station only by one channel for data transmission. This enhances channel utilization efficiency, thereby minimizing the occurrence of call loss.

If other requests for the same contents occur during the transmission of that contents, one downstream channel is allocated to all requesting telephone terminal sets for the transmission of the data of the same contents. Consequently, two or more telephone terminal sets can be

connected to a base station serving as a connection control station by one channel for data transmission. This enhances channel utilization efficiency, thereby minimizing the occurrence of call loss.

Further, the upstream channels allocated to the telephone terminal sets at the time of requesting for contents are sequentially allocated at time intervals which are integral multiples of a frame period. Alternatively, an allocated upstream channel is time divided into sub channels, which are allocated to all requesting telephone terminal sets. Because the data transmitted from each telephone terminal set are mainly composed of a request change, even the low-speed upstream channels can sufficiently serve their purposes.

CLAIMS

1. A method of connecting a plurality of telephone terminals to a junction station by a link multiplexed to provide a multiple of channels for downloading digital contents from a data source to a plurality of telephone terminals through the junction station in a telephone network, the method comprising the steps of:

detecting when a plurality of telephone terminals issue connection requests within a predetermined time interval to the junction station for downloading of the same digital contents; then

allocating one of the multiple of the channels of the multiplexed link commonly to the plurality of the telephone terminals to establish a downward connection from the junction station to the plurality of the telephone terminals; and

distributing the same digital contents by the commonly allocated channel concurrently to the plurality of the telephone terminals from the data source through the junction station.

2. The method according to claim 1, wherein the step of allocating allocates one of the multiple of the channels contained in a multicast link, which is reserved for

exclusive use of distributing digital contents to a plurality of telephone terminals.

3. The method according to claim 1, wherein the link is composed of a sequence of frames, and is multiplexed by dividing each frame into a multiple of time slots to define the multiple of the channels, and wherein the step of allocating allocates one time slot of each frame corresponding to said one channel cyclically to the plurality of the telephone terminals so as to establish an upward connection from each telephone terminal to the junction station.

4. The method according to claim 1, wherein the link is composed of a sequence of frames, and is multiplexed by dividing each frame into a multiple of time slots to define the multiple of the channels, and wherein the step of allocating further divides the time slot corresponding to said one channel to define a plurality of sub channels, and allocates the plurality of the sub channels to the plurality of the telephone terminals to establish an upward connection from the plurality of the telephone terminals to the junction station.

5. The method according to claim 1, wherein a plurality of telephone terminals are portable, and are connected to the junction station by a wireless link.

6. A method of connecting a plurality of telephone terminals to a junction station by a link multiplexed to provide a multiple of channels for downloading digital contents from a data source to a plurality of telephone terminals through the junction station in a telephone network, the method comprising the steps of:

allocating one of the multiple of the channels to one telephone terminal to establish a downward connection when said one telephone terminal issues a connection request to the junction station for the downloading of digital contents;

transferring the digital contents by the allocated channel to said one telephone terminal;

detecting when another telephone terminal issues a connection request to the junction station for downloading of the same digital contents during the transferring of the same digital contents to said one telephone terminal; and then

allocating the same channel to said another telephone terminal as said one telephone terminal to establish a downward connection from the junction station to said another telephone terminal such that a part of the same

digital contents can be distributed concurrently to said one telephone terminal and said another telephone terminal by the same channel.

7. The method according to claim 6, further comprising the step of continuing the distributing of the remaining part of the digital contents to said another telephone terminal after the distributing of the digital contents to said one telephone terminal is completed.

8. The method according to claim 6, wherein the step of allocating allocates one of the multiple of the channels contained in a multicast link, which is reserved for exclusive use of distributing digital contents to a plurality of telephone terminals.

9. The method according to claim 6, wherein the link is composed of a sequence of frames, and is multiplexed by dividing each frame into a multiple of time slots to define the multiple of the channels, and wherein the step of allocating allocates one time slot of each frame corresponding to said one channel cyclically to the telephone terminals so as to establish an upward connection from each telephone terminal to the junction station.

10. The method according to claim 6, wherein the link is composed of a sequence of frames, and is multiplexed by dividing each frame into a multiple of time slots to define the multiple of the channels, and wherein the step of allocating further divides the time slot corresponding to said one channel to define a plurality of sub channels, and allocates the plurality of the sub channels to the telephone terminals to establish an upward connection from each telephone terminal to the junction station.

11. The method according to claim 6, wherein a plurality of telephone terminals are portable, and are connected to the junction station by a wireless link.

12. A connection control station of a telephone network for connecting with a plurality of telephone terminals by a link multiplexed to provide a multiple of channels for downloading of digital contents from a data source to a plurality of telephone terminals, the connection control station comprising:

a detecting block that detects when a plurality of telephone terminals issue connection requests within a predetermined time interval for downloading of the same digital contents;

an allocating block responsive to the detecting block for allocating one of the multiple of the channels of the

multiplexed link commonly to the plurality of the telephone terminals to establish a downward connection to the plurality of the telephone terminals; and

a controlling block that obtains the digital contents from the data source through the telephone network and distributes the obtained digital contents concurrently to the plurality of the telephone terminals by the commonly allocated channel.

13. A connection control station of a telephone network for connecting with a plurality of telephone terminals by a link multiplexed to provide a multiple of channels for downloading of digital contents from a data source to a plurality of telephone terminals, the connection control station comprising:

an allocating block that allocates one of the multiple of the channels to one telephone terminal to establish a downward connection when said one telephone terminal issues a connection request for the downloading of digital contents;

a controlling block that obtains the digital contents from the data source through the telephone network and transfers the obtained digital contents to said one telephone terminal by the allocated channel; and

a detecting block that detects when another telephone terminal issues a connection request for downloading of the

same digital contents during the transferring of the same digital contents to said one telephone terminal, for enabling the allocating block to allocate the same channel to said another telephone terminal as said one telephone terminal so as to establish a downward connection to said another telephone terminal such that a part of the digital contents can be distributed concurrently to said one telephone terminal and said another telephone terminal by the same channel.

14. A machine readable medium for use in a junction station having a processor for connecting with a plurality of telephone terminals by a link multiplexed to provide a multiple of channels for downloading of digital contents from a data source to a plurality of telephone terminals through the junction station, the medium containing program instructions executable by the processor for causing the junction station to perform a method comprising the steps of:

detecting when a plurality of telephone terminals issue connection requests within a predetermined time interval to the junction station for downloading of the same digital contents; then

allocating one of the multiple of the channels of the multiplexed link commonly to the plurality of the telephone terminals to establish a downward connection from the

junction station to the plurality of the telephone terminals; and

distributing the same digital contents by the commonly allocated channel concurrently to the plurality of the telephone terminals from the data source through the junction station.

15. A machine readable medium for use in a junction station having a processor for connecting with a plurality of telephone terminals by a link multiplexed to provide a multiple of channels for downloading of digital contents from a data source to a plurality of telephone terminals through the junction station, the medium containing program instructions executable by the processor for causing the junction station to perform a method comprising the steps of:

allocating one of the multiple of the channels to one telephone terminal to establish a downward connection when said one telephone terminal issues a connection request to the junction station for downloading of digital contents;

transferring the digital contents by the allocated channel to said one telephone terminal from the data source;

detecting when another telephone terminal issues a connection request to the junction station for downloading of the same digital contents during the transferring of the

same digital contents to said one telephone terminal; and then

allocating the same channel to said another telephone terminal as said one telephone terminal to establish a downward connection from the junction station to said another telephone terminal such that a part of the digital contents can be distributed concurrently to said one telephone terminal and said another telephone terminal by the same channel.

FIG. 1

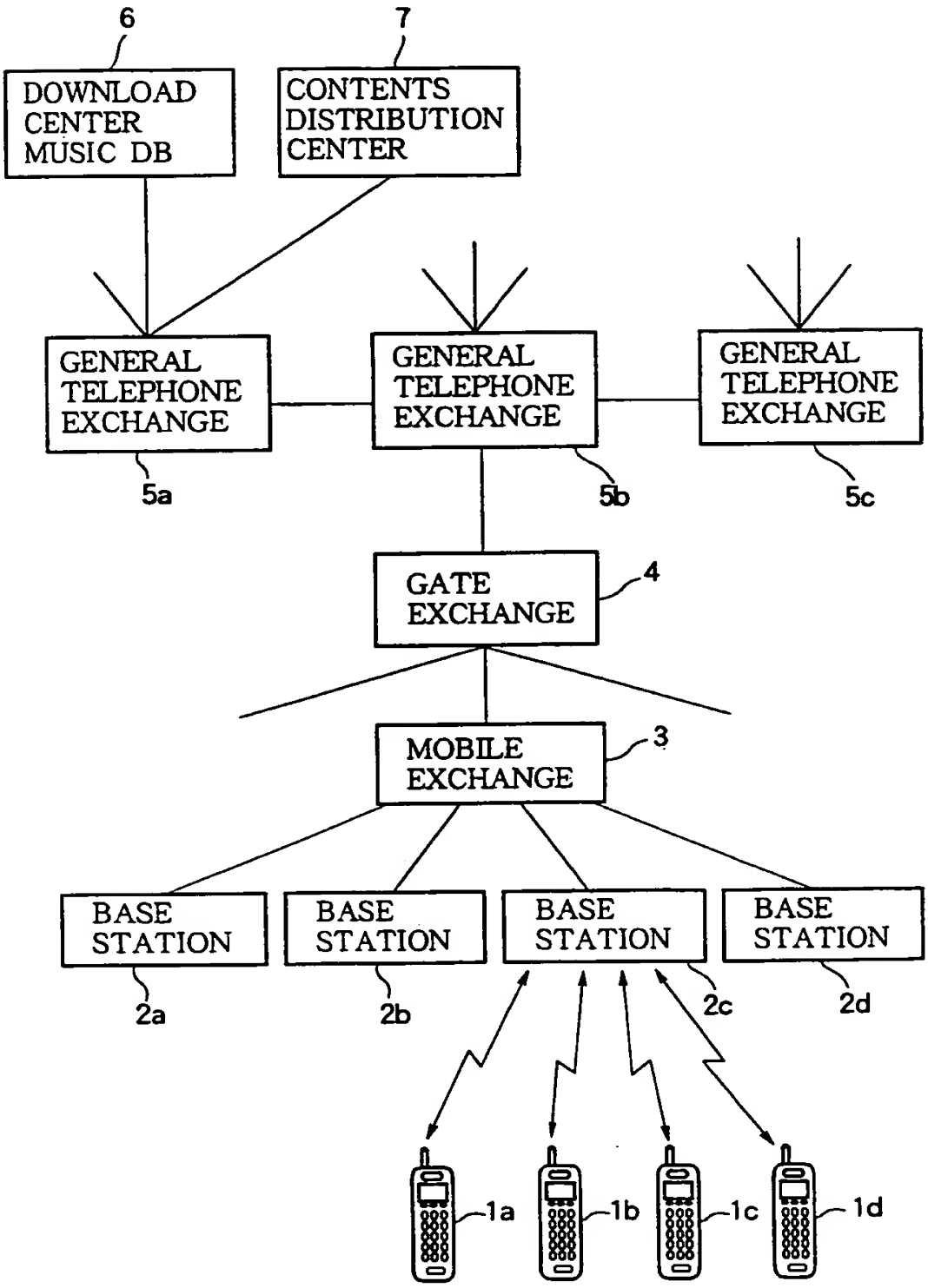


FIG.2

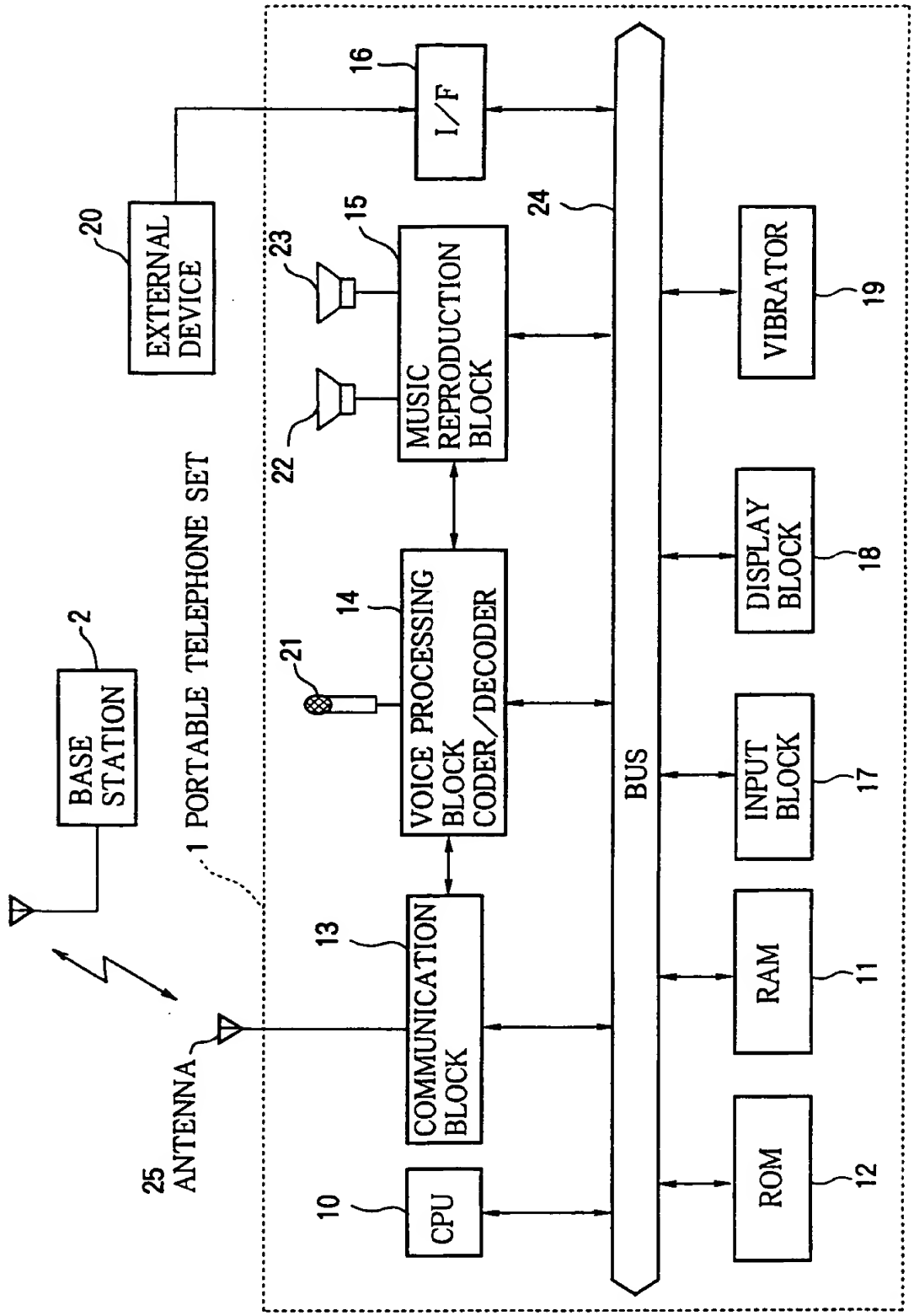


FIG.3

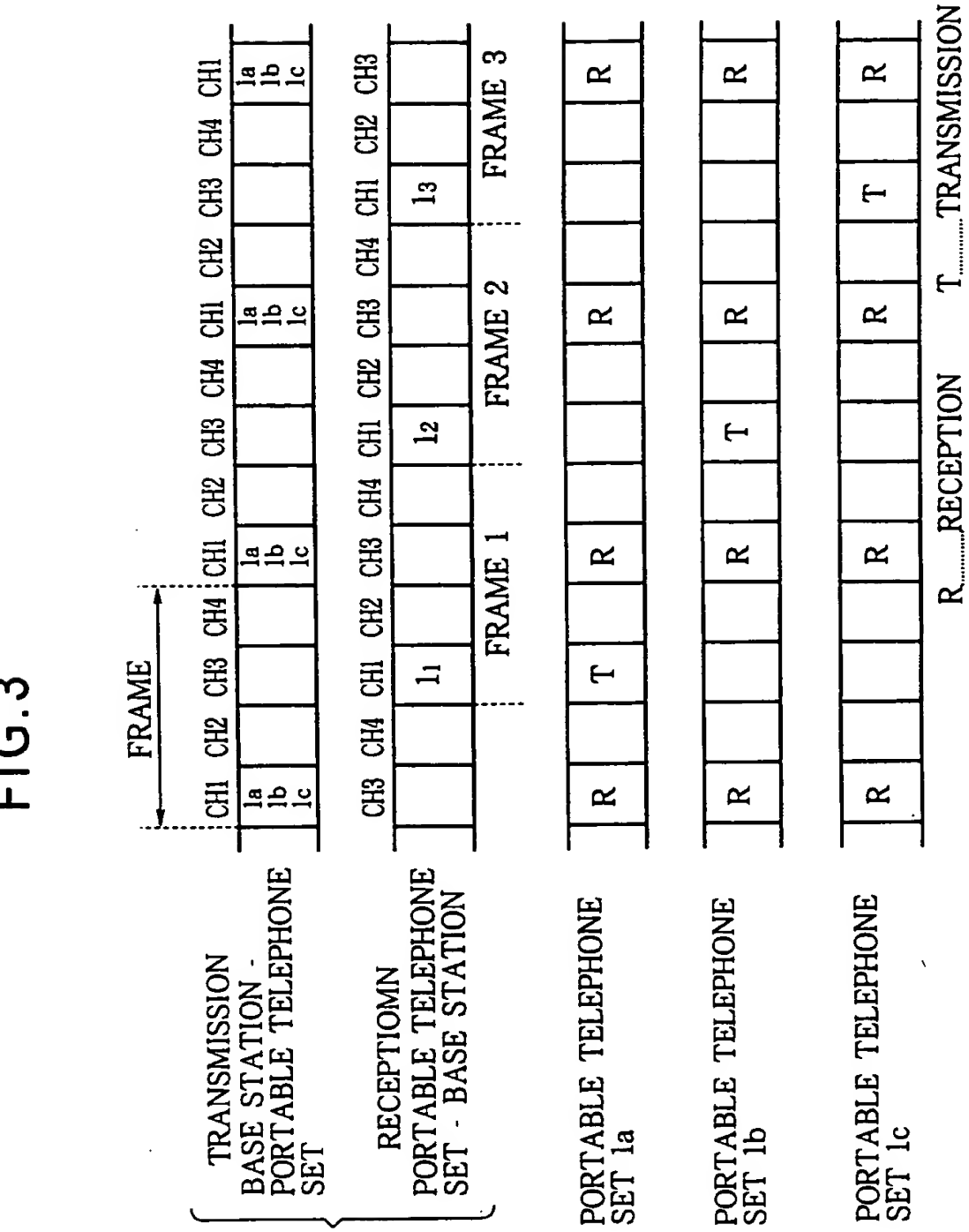


FIG.4

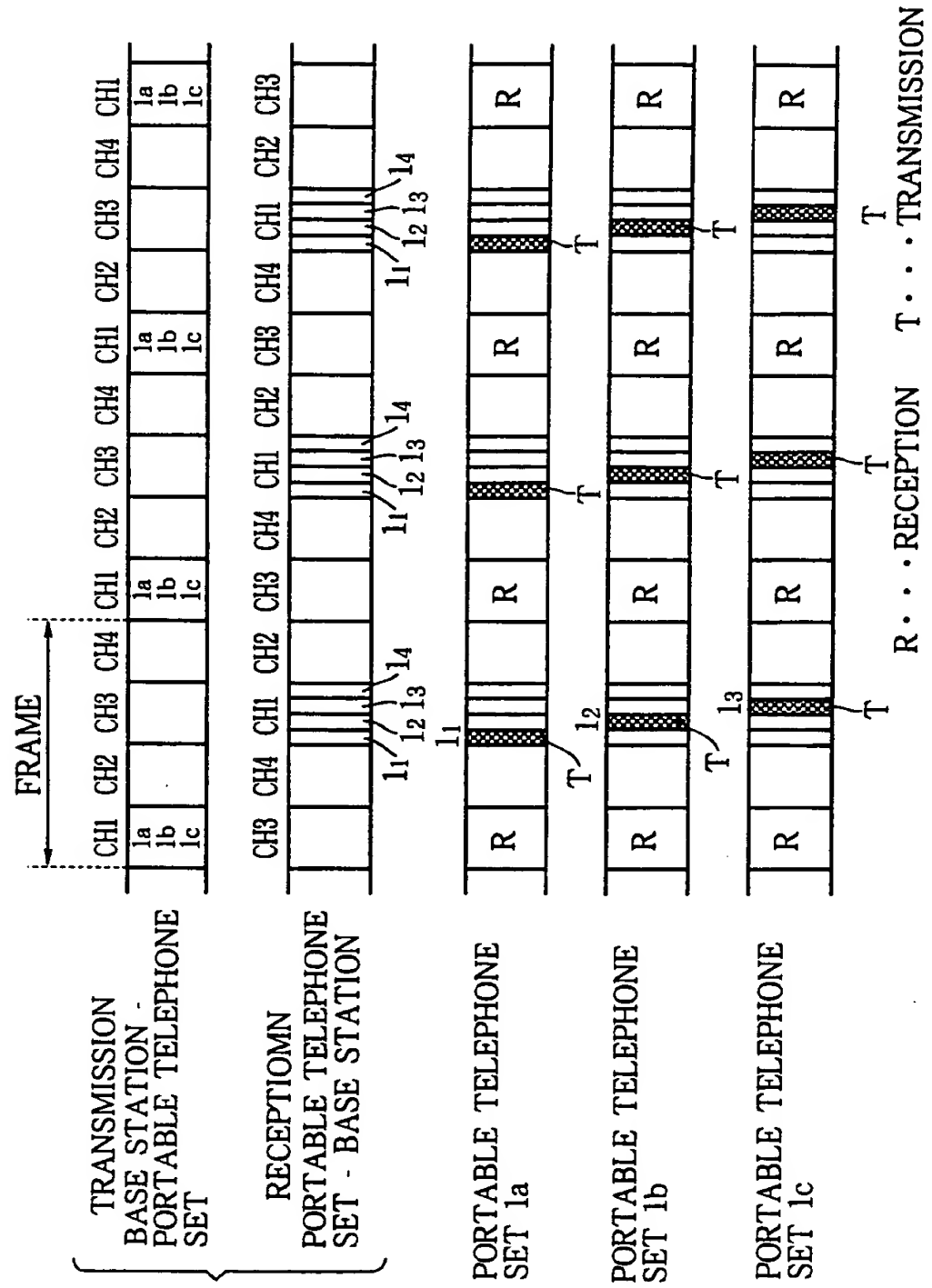


FIG.5

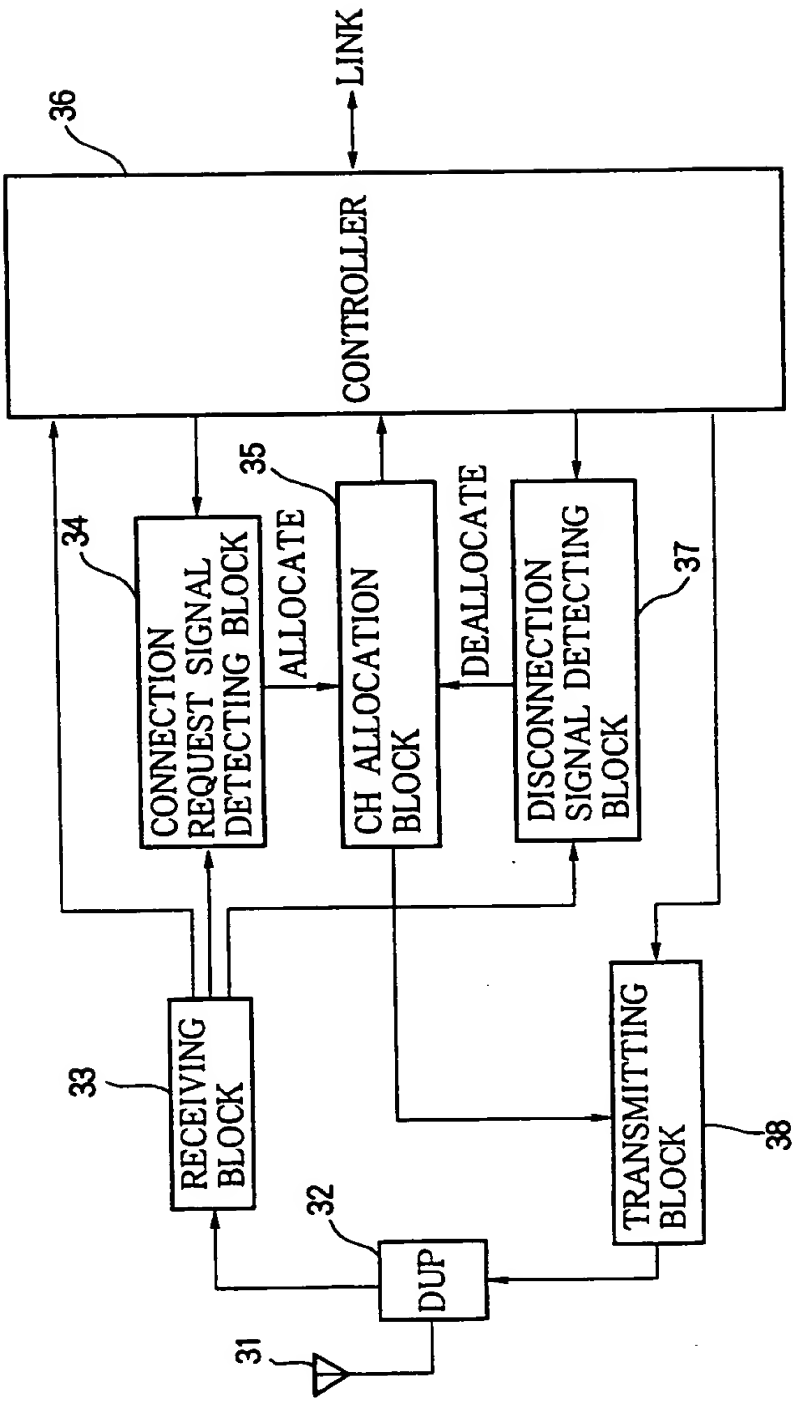


FIG.6

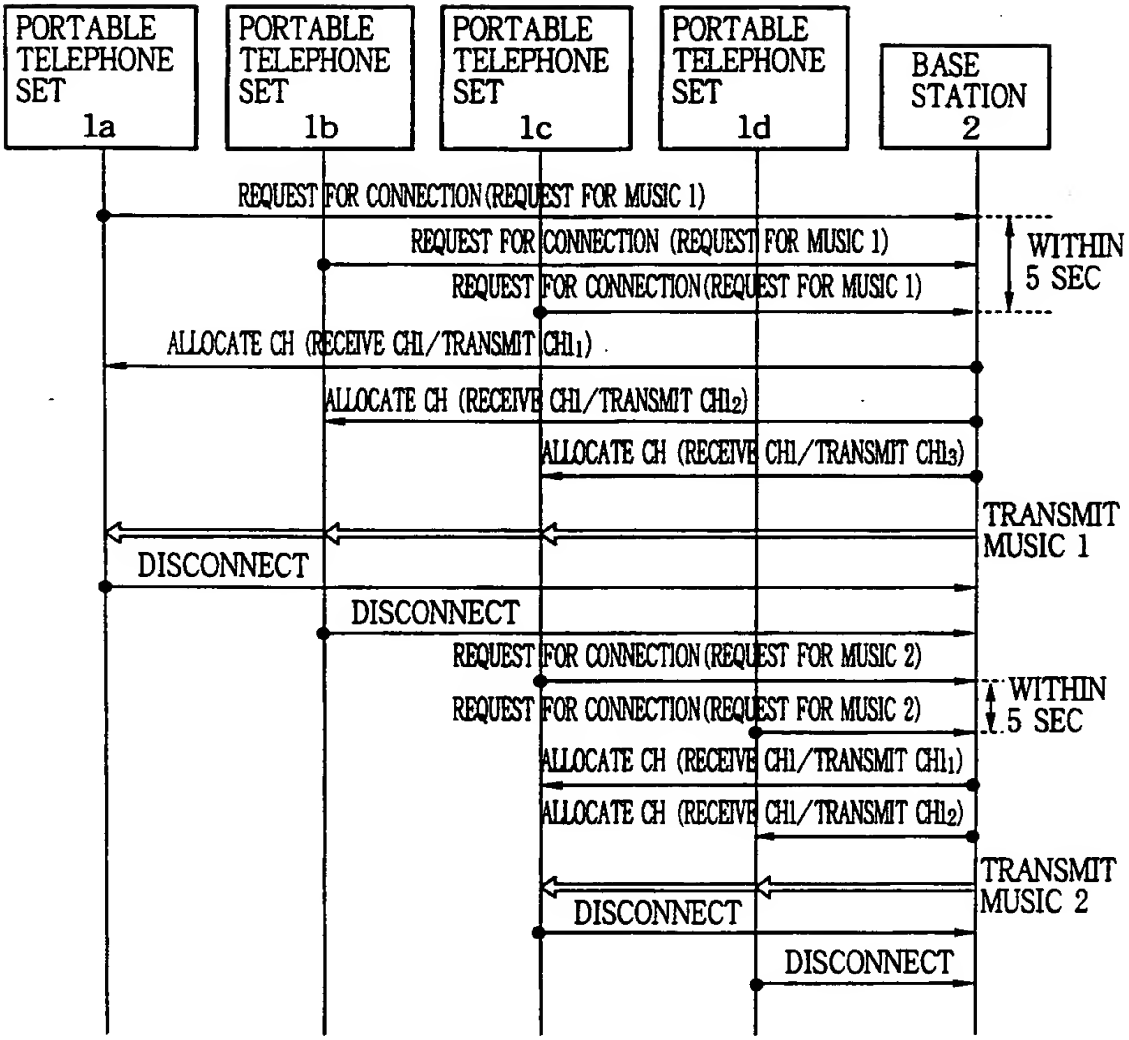
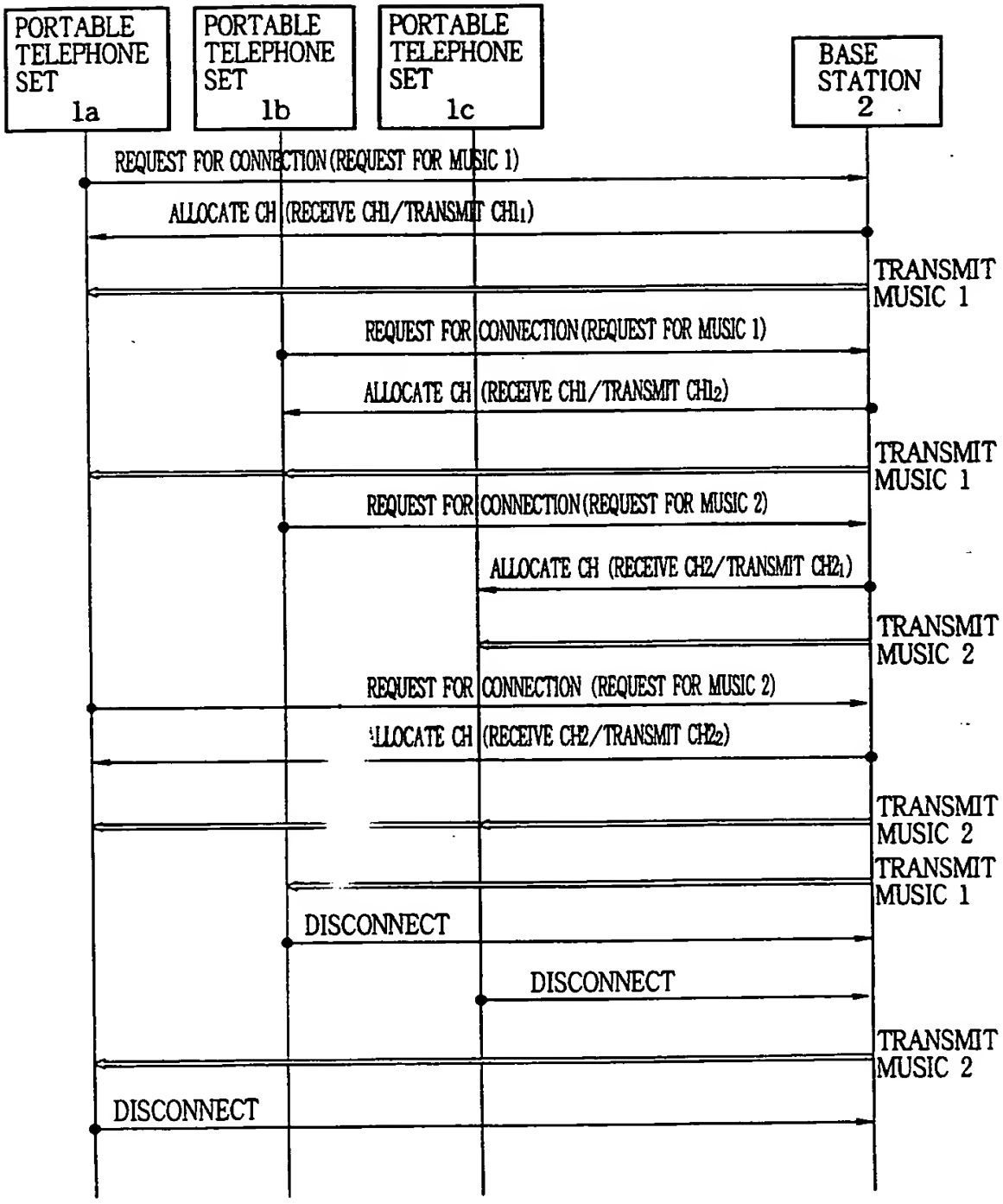
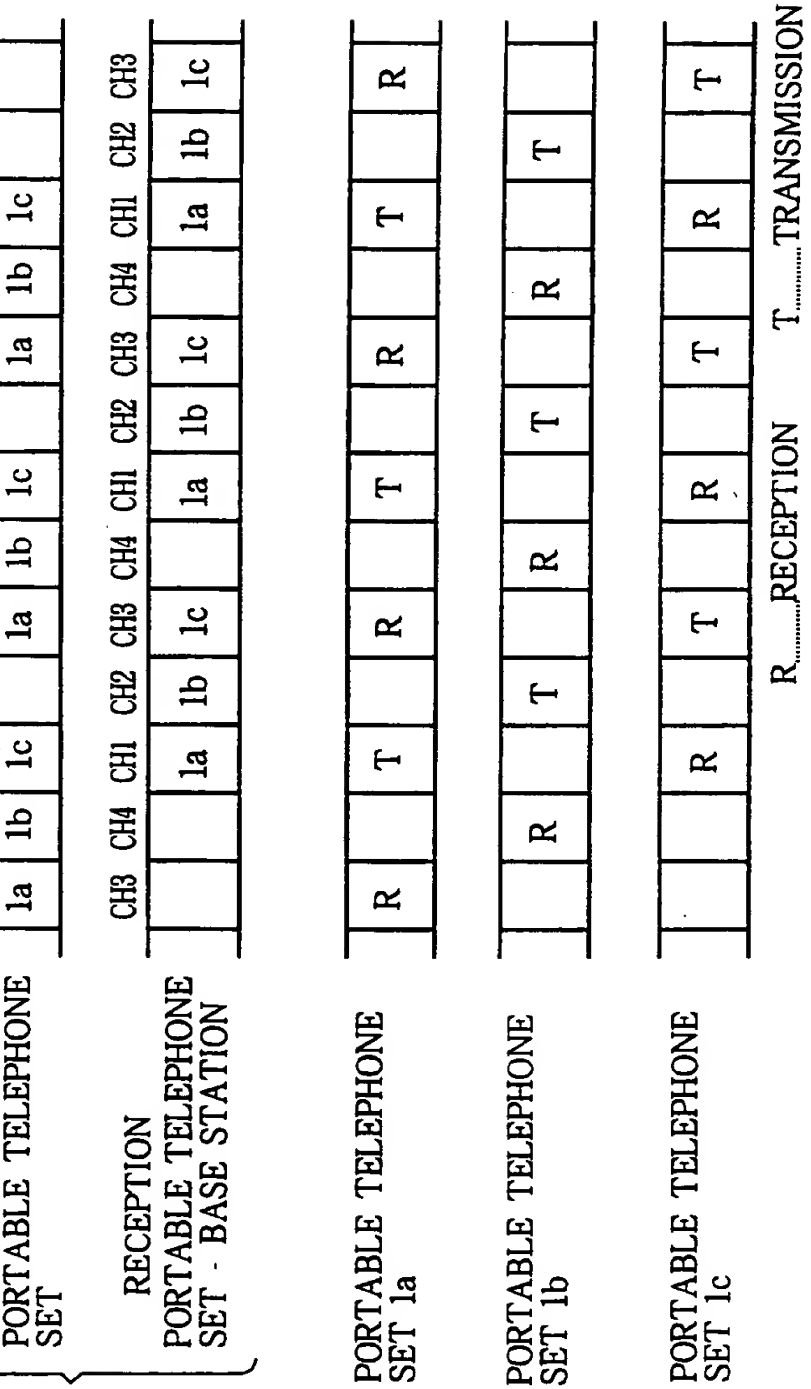


FIG.7



CH1, CH2 ..... RESERVED CHANNELS

FIG.8



INTERNATIONAL SEARCH REPORT

International Application No
PCT/JP 00/05638

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04Q7/22

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04Q H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 917 316 A (LUCENT TECHNOLOGIES INC) 19 May 1999 (1999-05-19) page 3, line 7 - line 20 page 7, line 45 -page 8, line 4 page 8, line 56 -page 9, line 14 page 9, line 34 - line 39 page 10, line 36 - line 42 page 11, line 13 - line 18 ---	1-15
X	EP 0 828 355 A (NOKIA MOBILE PHONES LTD) 11 March 1998 (1998-03-11) column 2, line 5 - line 12 column 2, line 31 - line 32 column 2, line 52 -column 3, line 19 column 3, line 36 - line 48 --- -/--	1,2,6, 12-15

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 November 2000	04/12/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Rothlübbers, C

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/JP 00/05638

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	XYLOMENOS G ET AL: "IP MULTICAST FOR MOBILE HOSTS" IEEE COMMUNICATIONS MAGAZINE,IEEE SERVICE CENTER. PISCATAWAY, N.J,US, vol. 35, no. 1, 1997, pages 54-58, XP000683443 ISSN: 0163-6804	
A	BROWN K ET AL: "RelM: reliable multicast for mobile networks" COMPUTER COMMUNICATIONS,ELSEVIER SCIENCE PUBLISHERS BV, AMSTERDAM,NL, vol. 21, no. 16, 15 October 1998 (1998-10-15), pages 1379-1400, XP004141701 ISSN: 0140-3664	

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/JP 00/05638

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0917316 A	19-05-1999	CA 2249818 A	14-04-1999
		CA 2249819 A	14-04-1999
		CA 2249840 A	14-04-1999
		CA 2249864 A	14-04-1999
		CA 2249865 A	14-04-1999
		CA 2249866 A	14-04-1999
		CA 2249868 A	14-04-1999
		EP 0912015 A	28-04-1999
		EP 0912016 A	28-04-1999
		EP 0915592 A	12-05-1999
		EP 0917317 A	19-05-1999
		EP 0913968 A	06-05-1999
		EP 0910176 A	21-04-1999
		JP 11298532 A	29-10-1999
		JP 11261623 A	24-09-1999
		JP 11289339 A	19-10-1999
		JP 11289340 A	19-10-1999
		JP 11298533 A	29-10-1999
		JP 11289351 A	19-10-1999
		JP 11289341 A	19-10-1999
		US 6115390 A	05-09-2000
EP 0828355 A	11-03-1998	US 5887252 A	23-03-1999
		BR 9703778 A	10-11-1998
		CN 1181667 A	13-05-1998
		JP 10107770 A	24-04-1998